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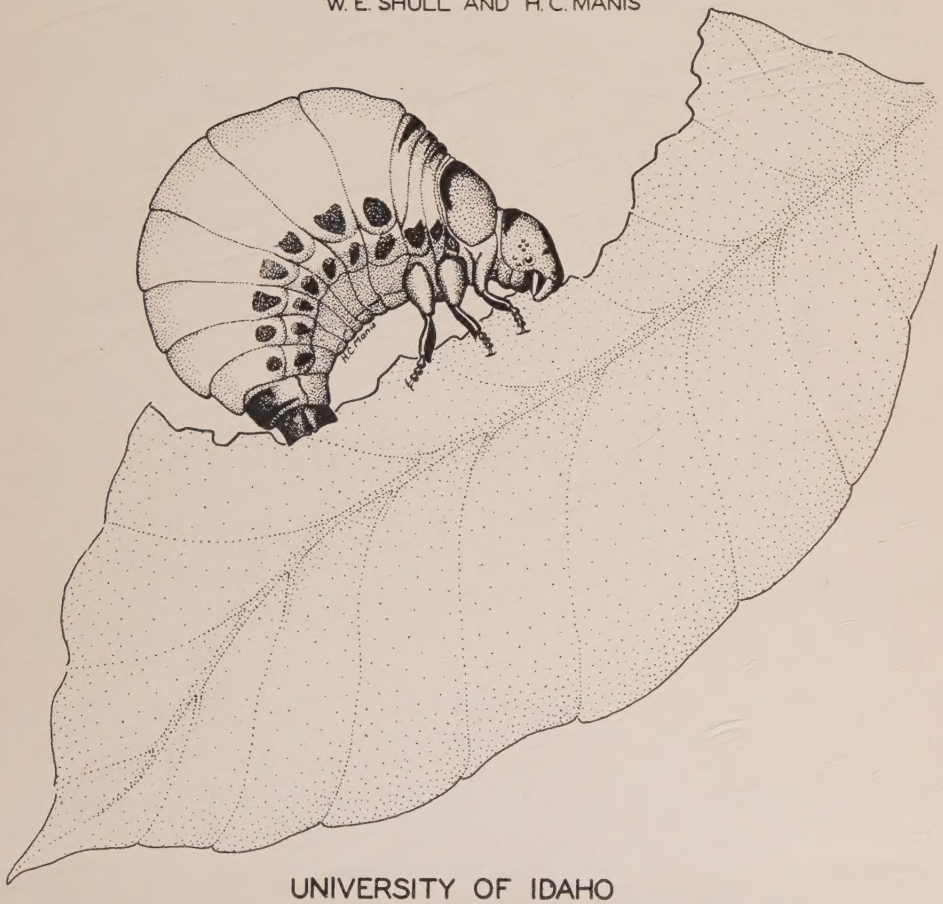
Potato Insect Control

BY
W. E. SHULL AND H. C. MANIS



UNIVERSITY OF IDAHO
COLLEGE OF AGRICULTURE
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Potato Insect Control

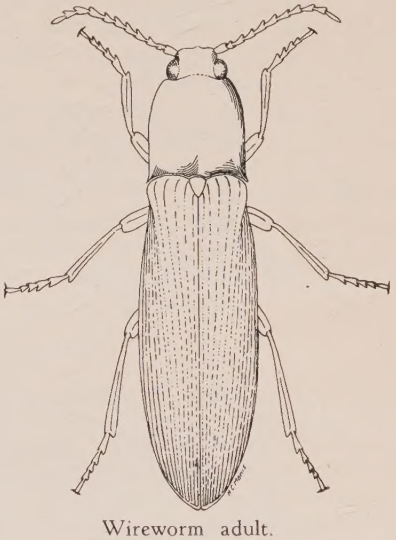
W. E. Shull and H. C. Manis*

THIS bulletin briefly describes the biology and control of all insects known to attack potatoes in Idaho. Other insects may occur on potatoes from time to time, but they cause no damage.

Much misinformation is prevalent in this state concerning the presence of certain potato insects which are very destructive to potatoes in other parts of the United States. Very recent surveys of potato insects in Idaho definitely have shown that only those presented in this bulletin occur here and that certain other destructive species are not present. Among those not present are the tomato psyllid, potato tuber moth, eastern potato leafhopper, eastern potato flea beetle, tuber flea beetle, and the true potato aphid. All of these insects are extremely destructive to potatoes in certain areas of the United States but none of them are present in Idaho.

Wireworms

Wireworms are the most destructive insect pests of potatoes found in Idaho. The loss caused by them is steadily increasing in most irrigated sections of the state. These hard, shiny, yellow worms bore into the potato tubers and into seed pieces. The adults are slender, brown or black, hard-shelled beetles known as click beetles. They are present in the adult stage for but a short time in the spring during the mating and egg-laying period. Almost their entire life of several years is spent beneath the surface of the soil.



Wireworm adult.

Determination of Wireworm Populations in Potato Fields—It is not difficult for the potato grower to learn whether wireworms are present in a given field, and whether they are numerous enough to endanger his potatoes. Such information is desirable before plantings are made. Simple soil-sifting equipment may be constructed and used for estimating populations. Twenty well-scattered test holes of about ¼ square foot each and 1 foot deep should be dug with a post-hole auger or a shovel and the soil thoroughly sifted. If no worms are found in 20 holes, it is safe to plant any crop; with 0 to 4 worms to 20 holes, late potatoes may be planted; 5 to 8 worms, early potatoes. The figures given indicate in a general way

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the safe limits of infestation under which potatoes can be satisfactorily grown.

Wireworm larva

Control: Avoid the use of clovers in crop rotations on land infested with wireworms. Dry soil is harmful to wireworms and will kill them if the dry period is prolonged. Alfalfa is the key crop in wireworm control rotations. The high populations of wireworms usually decrease after each succeeding year of alfalfa. If the stand becomes thin or weedy it may be plowed up after 3 years but in most cases it should be used for 4 years in the rotation. The last year in alfalfa the field should not be watered. Alfalfa should be followed with the crop to be used in the rotation which is most susceptible to wireworm damage, such as potatoes. The field should be returned to alfalfa as soon as wireworm populations are high enough to cause damage to the crops planted. Alfalfa should not be seeded with the grain but should be sowed alone after the grain harvest. The field should be plowed whenever possible during the first 10 days of August to break up the pupa cases, thus destroying many wireworms.

Crude napthalene, if thoroughly mixed with the soil, kills wireworms by fumigative action. Broadcast 250 pounds of finely sifted napthalene flakes per acre and thoroughly disk it in. Plow the ground 8 to 10 inches deep, broadcast another 250 pounds of napthalene, then disk again, crossing the plow furrows. Applications may be made from April to September and crops may be planted 5 to 7 days after treatment.

Colorado Potato Beetles

Adults of the Colorado potato beetle are plump, yellow and black striped insects about ⅜ inch long. There are five black lines running lengthwise on each wing. The eggs are orange-yellow and are deposited in clusters of 10 to 12 on the undersides of potato leaves. The young are brick-red, humped-back larvae about ½ inch long. The color changes to orange as the larvae grow. There are two rows of black spots along each side of the body.

Colorado potato beetle (adult).

Both the adults and their young feed upon the foliage of potatoes and closely related plants, often completely defoliating the vines. Mature larvae drop to the ground and burrow into the soil a short distance, to pupate. They remain in this stage 5 to 10 days and then change to the adults. They over-winter as adults at a depth of 6 to 12 inches in the soil. A partial second generation is sometimes produced.

Control: Fields should be watched closely during the spring and early summer for the presence of the beetles on the young plants. If only a

few beetles are found, they may be destroyed by hand with little effort and thus many later infestations prevented. Such procedure might easily delay for some time the need for expensive spraying or dusting machinery.

Dusting potato plants with calcium arsenate is effective in controlling the potato beetle. Calcium arsenate dust applied with a hand duster is especially recommended for use in home gardens and in large fields where the insects are found in only a few scattered places. Calcium arsenate dust is diluted at the rate of 1 part to 3 parts of inert carrier such as talc, diatomaceous earth, hydrated lime or low-grade flour. Use sufficient material to obtain a fine covering of dust over all the leaves. Twenty pounds of dust per acre should give this coverage when the potato vines are well grown. A little less would be sufficient when the potatoes are small. The dust should be applied to large fields with a power duster.

Spraying potatoes with calcium arsenate is effective and to be recommended when dusting equipment is not available. The calcium arsenate should be mixed at the rate of 4 pounds per 100 gallons of water. At least 100 gallons of spray liquid to an acre must be used to obtain good coverage. Lead arsenate spray or dust may be used in the same dilutions and at the same rate per acre.

Treat the infested potatoes soon after the larvae hatch and start to feed, certainly before they seriously injure the plants. One application of the dust or spray usually gives a high degree of commercial control. When infestations are heavy it may be necessary to repeat the treatment two or three times at intervals of a week or 10 days. The insects rarely cause injury late in the summer if the early applications are thorough. The new insecticide DDT seems to show promise as a control for the Colorado potato beetle when used as a 1 percent dust.

Flea Beetles

There are several species of flea beetles found on potatoes in Idaho, but none of them cause severe damage to potatoes. Other species of flea beetles not found in Idaho, but which are present in neighboring states, do cause severe damage to potatoes in those states. The western potato flea beetles, the most commonly found flea beetles on potatoes in Idaho, are shiny black, and are easily recognized by the enlarged hind legs and by their habit of hopping when disturbed. Their injury consists of very small, rounded or irregular holes eaten into the leaf, so that the injured leaves look as though they had been peppered with fine shot. When flea beetles are abundant, they may kill the plants. They attack a number of other vegetables, such as tomato, eggplant, cabbage, radish, peppers, beans, and numerous weeds.

Western potato flea beetle.

The beetles hibernate during the winter under leaves, grass, or other trash around the margins of the fields. The adults emerge from hibernation in the spring, first feeding upon weeds but later migrating to cultivated plants. The tiny, white eggs are laid in the soil around the base of the plant. The young larvae feed upon roots and occasionally the tubers.

The full grown larvae pupate in the soil. Second generation adults emerge from the pupae in late July or early August. There are two generations each year in Idaho.

Control: Frequent and properly timed applications of either a 25 percent calcium arsenate or 35 percent cryolite dust are necessary in order to control the western potato flea beetle. The number of dust applications required varies according to the time that the potatoes are planted. Early and late plantings usually require only four applications but those planted in mid-season require five or six dustings. The first application should be made as soon as the plants can be seen in rows and the second dust should be applied in 10 days. The remaining dusts should be applied at about 12-day intervals. These dusts should be applied at the rate of from 15 to 30 pounds per acre depending on the size of the vines. It is preferable to dust early in the morning when the air is still and the dust sticks to the dew-covered plants. Indications are that the new insecticide DDT will be effective in flea beetle control, but the method of its use for that purpose has not been entirely worked out.

Seedcorn Maggots

Adult seedcorn maggots are grayish-brown flies about $^1/_5$ inch long. The cream-colored larvae or maggots are found burrowing in potato seed pieces, particularly during cold, wet springs. This insect tunnels into the seed piece before plant growth takes place, usually causing it to fail to sprout, or, if it does, the plant is weak and sickly.

Seedcorn maggot.

The winter is passed in the pupal stage in the soil near where maggots were feeding the previous autumn. About the middle of May the adult fly emerges and lays her eggs in the soil near some form of decaying vegetable matter, such as turned-under manure or humus. The eggs hatch in a few days and the tiny maggots work their way into any suitable food which may be nearby. Injury is usually most severe on land rich in organic matter. There are about three generations a year.

Control: No direct control method is known. The flies which lay their eggs on the soil are known to be attracted by the presence of freshly decaying organic matter. In potato fields it is best to turn under the manure or green cover to be used as fertilizer in the autumn rather than to do it in the spring just before planting. Satisfactory stands in infested fields are obtained by replanting as soon as it is determined the first planting will be unproductive. The second planting usually remains free of injury.

Intermountain Potato Leafhoppers

Adult intermountain potato leafhoppers are slender, wedge-shaped, pale green insects about $^1/_8$ inch long. They apparently overwinter in the adult stage in grass and weeds at the margins of fields and elsewhere. They emerge in the spring and begin laying eggs in the tissues of their favorite host plants. The eggs hatch in about a week to 10 days, and the nymphs, which are smaller than the adults and wingless, feed upon the

leaves of the host plant. Their feeding causes a speckled, white-stippled appearance of the leaves, especially the lower ones. These insects do not cause severe damage to potatoes and are not responsible for early maturity of potato vines.

Control: Experimental work definitely shows that control of this insect is unwarranted. Should control seem necessary, the use of either insecticide described below, when available, gives very good control: pyrethrum-rotenone dust, containing $^1/_{10}$ percent pyrethrins and 1 percent rotenone, and a spray containing 2 gallons of 32° Baume liquid lime sulfur, $^2/_{10}$ gallon of pyrethrum concentrate and 1 pound of soap in each 100 gallons of spray. The dust should be applied at the rate of 25 pounds per acre and the spray at the rate of 80 gallons per acre. Three applications at approximately 14-day intervals are necessary.

Intermountain potato leafhopper.

Legume Bugs

Adult legume bugs are about ¼ inch long, of general flat-angular shape and are quite active. One species is yellowish-green to brown in color. There is a triangular area between the bases of the wings which is yellowish-green and V-shaped. Another species is much lighter in color and the V-shaped mark between the bases of the wings is brilliantly colored. The adults spend the winter beneath any protecting materials available. The eggs are laid in the native and cultivated host plants. There are several overlapping generations each year. The young look much like the adults except that they have no wings.

Lygus adult.

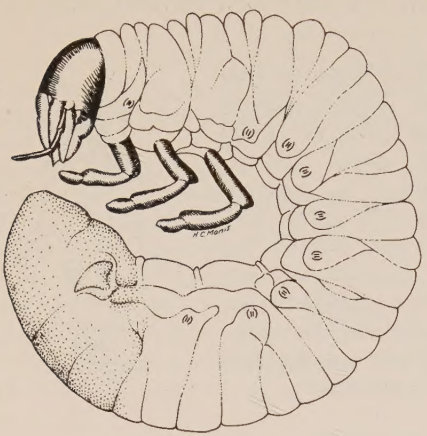
Legume bugs breed freely on legume plants, especially alfalfa, and fly to potato fields or other adjacent crops when the alfalfa is cut. They cause the potatoes to appear wilted and the leaves to curl temporarily. The injury is seldom severe or of long duration because they fly back to alfalfa when that crop has begun to grow again.

Control: No entirely satisfactory control of legume bugs is yet known, but control on potatoes is very seldom necessary. The new insecticide DDT shows promise as a legume bug control material.

White Grubs

Potatoes are frequently injured by large white grubs which live in the soil and attack the tubers and roots. They eat irregular holes in tubers and in some cases cause very serious damage. The mature grub is about

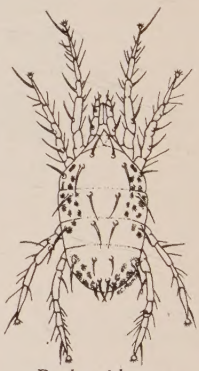
1½ inches long and is grayish-white for the most part, with brown head and legs. Grubs are usually found in a curled, crescent-shaped position when dug out of the ground. The adult form is a beetle. The most common one in Idaho is the ten-lined June beetle. This beetle is grayish with 10 black lines running lengthwise on the back. Adults of other species are large, reddish-brown beetles measuring from about ½ to ¾ inch long. They are often attracted to lights in the summertime and make loud buzzing noises when in flight.


White grub.

Control: There is no good control known for these insects. Avoid planting crops susceptible to grub injury on recently broken sod in areas where grubs are present. Pull affected plants and destroy the grubs to prevent them from attacking adjacent sound plants. Injured plants are detected by their wilted appearance.

Red Spiders

The common red spiders in Idaho include more than one species. They are often spoken of as two-spotted mites because they usually have two irregular dark spots on the back. The color varies from lemon-yellow to a yellowish-green, but during the fall migration period, it becomes red or orange. The adults overwinter in the soil and migrate to growing plants in the early spring. They occasionally migrate from newly cut clover to adjacent potatoes during the growing season. Red spiders attack many kinds of cultivated plants and are readily recognized by the dense webbing which they spin on the leaves, especially on the under sides. These spiders feed beneath the web which also protects the young. There are several generations annually. Injured leaves become dry and leathery, turn red or brown in color, and often fall prematurely. Severe damage may be done in a very short time.


Red spider.

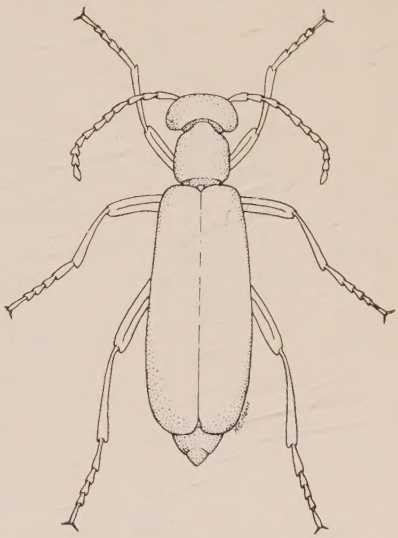
Control: The best method of control on potatoes is to apply dusting sulphur to the infested plants at the rate of 25 pounds per acre.

Blister Beetles

Three species of blister beetles are sometimes injurious to potatoes, especially those near the margins of fields. The spotted blister beetle is the most common. It is from ½ to ¾ inch long, of general gray appearance with small black spots. The ash-gray blister beetle, somewhat smaller than the spotted blister beetle, is uniformly gray in color. Nuttal's blister

beetle, is green or purplish-blue, varying from about 5/8 to 1 1/8 inches long.

The work of the adults resembles that of the Colorado potato beetle. Although always present, these insects only occasionally do serious damage. Eggs are laid in the soil, and the larvae feed upon grasshopper eggs. Infestations usually occur in areas where grasshoppers have been numerous. The winter is passed in the pupa stage. Adults emerge from June to September. There is only one generation a year.



Blister beetle.

Control: The control of blister beetles is seldom necessary and not often desirable because their larvae feed upon grasshopper eggs and are, therefore, valuable. When control is necessary, apply the same materials as for the Colorado potato beetle. Sodium fluosilicate may also be used when diluted with equal parts of hydrated lime. Rotenone dusts are also very effective.

Tomato Worm

The tomato worms are the larvae of the sphinx or hawk moths. They are large green worms having a "horn" on the rear end of the body, and white V-shaped markings on the sides. They rarely become abundant, but a few of them may cause heavy defoliation.

Tomato worm.

Control: Hand-pick and destroy the caterpillars, or, in extreme cases, spray with calcium arsenate, 2 pounds to 100 gallons of water, or dust with calcium arsenate as for the Colorado potato beetles.

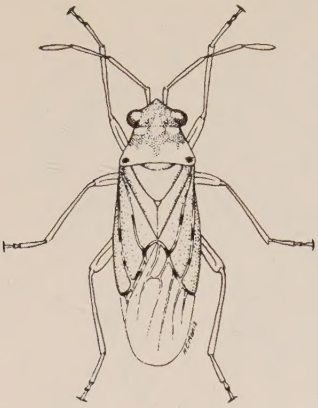
Aphids

The true potato aphid which is so destructive to potatoes in eastern states is not present in Idaho. Other aphids occur on potatoes but rarely cause damage. Leaves on plants which are heavily infested curl, turn yellow or brown and die. Aphids are small, green or greenish-yellow, soft-bodied insects which feed in clusters, chiefly on the undersides of leaves. The winged forms migrate to potatoes from other plants or adjacent fields where they start new colonies.

Aphid.

Control: Nicotine sulphate, 1 part to 500 parts of soapy water, thoroughly applied, will give fair control, if the temperature is above 70° Farenheit when the material is applied.

False Chinch Bug



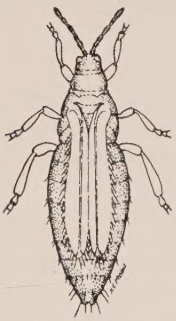
False chinch bug.

False chinch bugs are small, brown to black, flat-bodied bugs that suck sap from the leaves. When numerous, they cause leaves to wilt, turn brown, and become crisp. They usually breed in weedy areas, and when the weeds dry up following drouth periods, they may migrate to potatoes in adjacent areas.

Control: Destroy the weeds in spring and fall or use barriers to prevent migration into potato fields.

Onion Thrips

Onion thrips adults are tiny brownish to black insects which sometimes fly from weeds or other crops to potatoes when their other hosts are no longer suitable as food plants. The immature thrips are yellow. They cause damage to potatoes only occasionally.



Onion thrips.

Control: Spray with a mixture of 2 pounds of tartar emetic, 1 gallon of sugar beet molasses or 4 pounds of sugar in 100 gallons of water. Apply at the rate of 100 gallons of spray per acre. Two sprays applied at 7-day intervals is the minimum number of sprays required. The first application should be made when the thrips injury to the plant first becomes noticeable and before serious damage has been caused.

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